IBM Software Group

# Achieving Agility at Scale
# Improving Software Economics

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Rational. software


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# Agenda

- **Managing Variance: the Value of Agile Methods**
- Controlling Software Economics Through Measurement
- IBM's Transition to Agility @ Scale
- Some Final Thoughts

# Software development obsolesced by software delivery

| Software Development | Software Delivery |
| --- | --- |
| *Distinct development phase* | ***Continuously evolving systems*** |
| *Distinct handoff to maintenance* | ***No distinct boundary between development and maintenance*** |
| *Requirements-design-code-test sequence* | ***Sequence of released capabilities with ever increasing value*** |
| *Phase and role specific tools* | ***Common platform of integrated process / tooling*** |
| *Collocated teams* | ***Distributed, web based collaboration*** |
| *Standard engineering governance* | ***Economic governance tailored to risk / reward profiles*** |
| *Engineering practitioner led* | ***Business value and outcome led*** |

# Critical culture shifts in improving software economics

## *Conventional Governance*

**Activity-based management**
- Mature processes, PMI/PMBOK
- Plan in detail, then track variances

**Adversarial relationships**
- Paper exchange, speculation

**Requirements first**
- Assumes certainty in desired product
- Avoid change

**Early false precision**
- "More detail = higher quality"

**Apply too much or too little process**
- Process is primary, blind adherence

## *Agile Governance*

**Results-based management**
- More art than engineering
- Plan/steer/plan/steer…

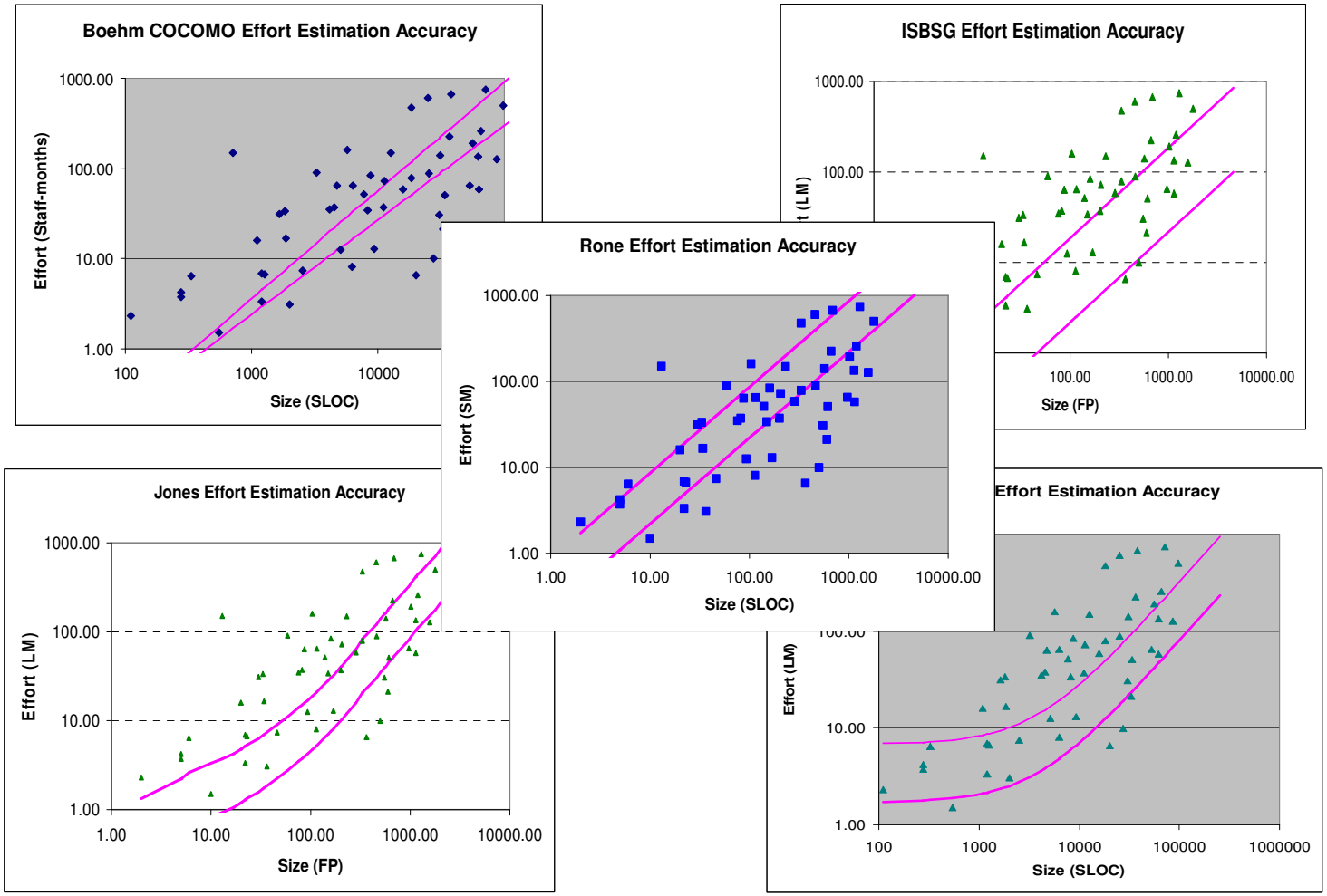
**Honest collaborative communication**
- Progressions/digressions, facts

**Architecture (*risk mitigation*) first**
- Admits uncertainties
- Manage change

**Evolving artifacts**
- Scope (Problem specs)
- Design (Solution specs)
- Constraints (Planning specs)

**Right-size the process**
- Desired results drive process
- Manage variances

# Software cost models




From George Stark, Paul Oman, “A comparison of parametric Software Estimation Models using real project data”, in press

# Improving software economics

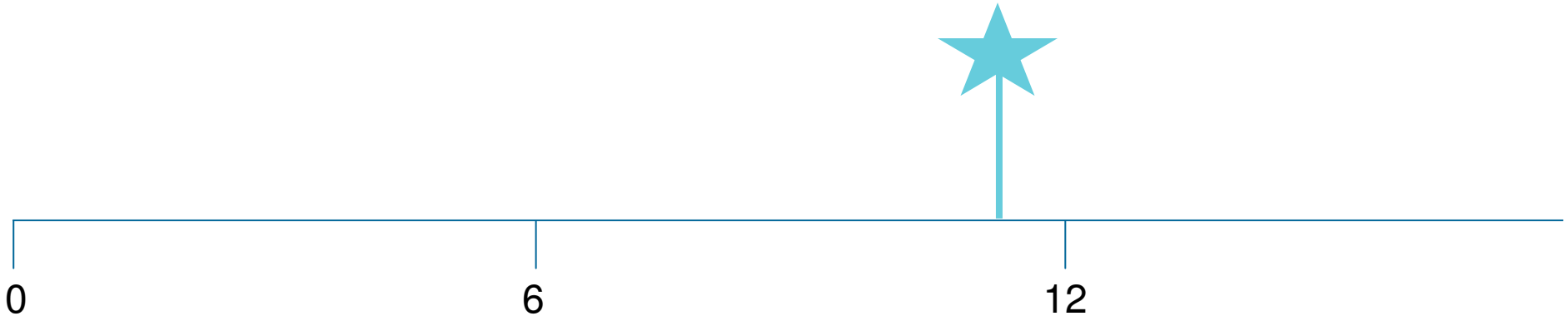
- Empirical software cost estimation models for:
  - Enterprise modernization, software maintenance
  - New developments, new releases, early prototypes
  - Packaged applications, systems engineering

**Time or Cost To Build = (Complexity) $^{(Process)}$ * (Team) * (Tools)**

| Complexity | Process | Team | Tools |
|---|---|---|---|
| ▪ Volume of human generated stuff<br>- KSLOC, FPs, UCs<br>▪ Quality/performance<br>▪ Scope | ▪ Methods<br>▪ Maturity<br>▪ Agility<br>▪ Precedence | ▪ Skills/Experience<br>▪ Collaboration<br>▪ Motivation | ▪ Automation<br>▪ Process enactment |

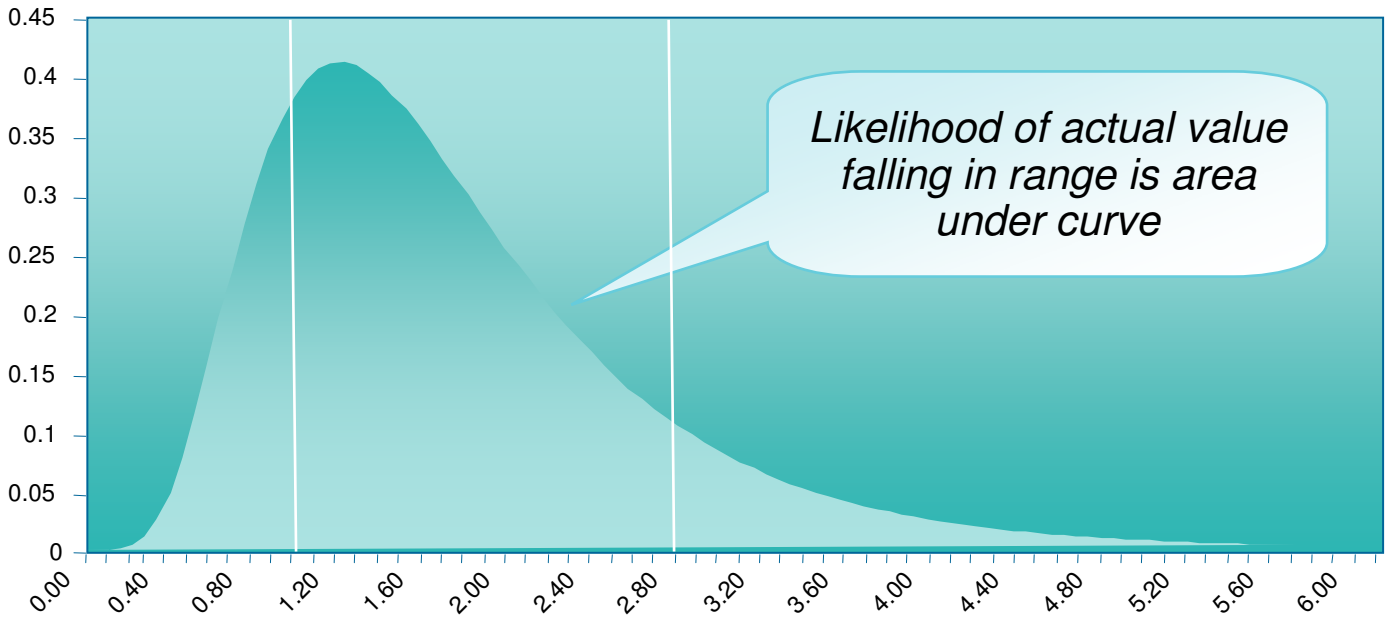
# Schedule risk: Imagine you have 12 months to deliver a business critical system

- Your estimators tell you it will be done in 11 months
- What do you do with the information?
  - Rest easy, believing there is no risk?



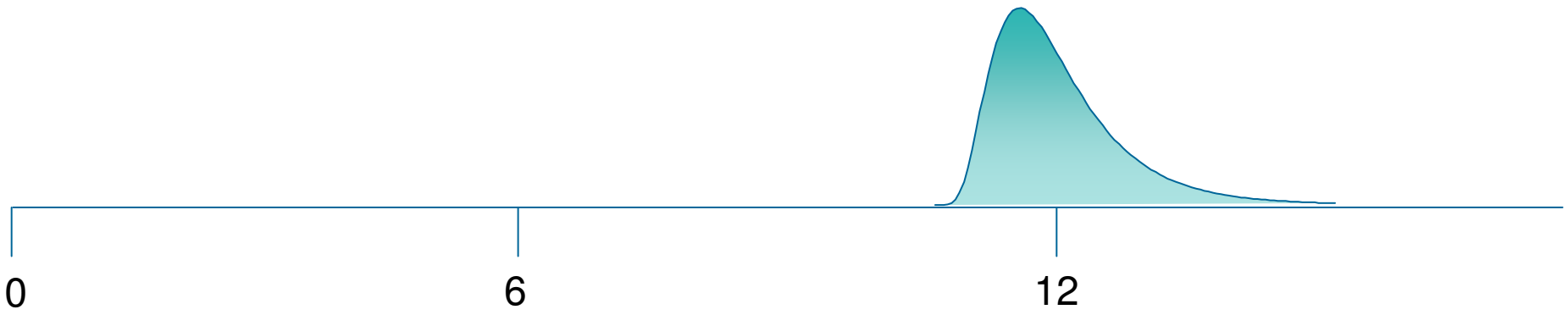
# Maybe you realize that program parameters (cost, schedule, effort, quality, …) are random variables

- Area under curve describes probability of measurement falling in range



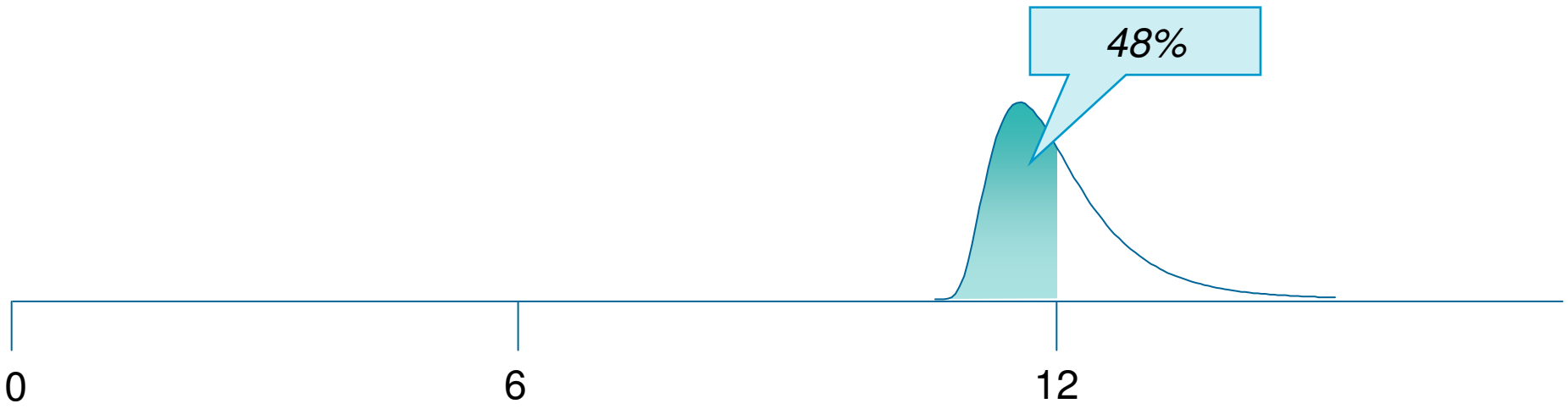
# Imagine you have 12 months to deliver a business critical systems

- So you ask for the distribution and discover there is some uncertainty



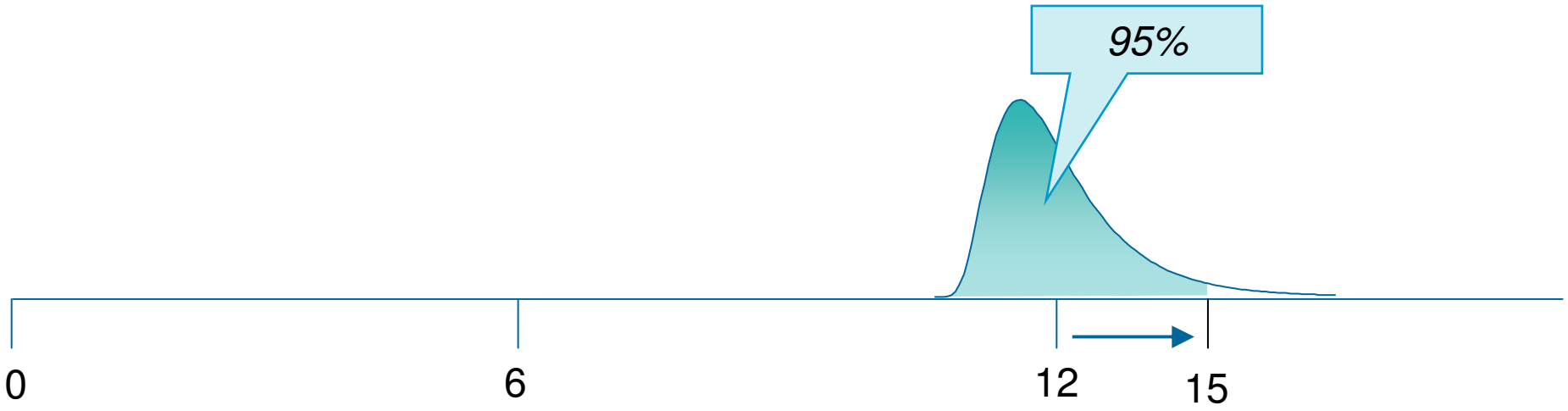
# Imagine you have 12 months to deliver a business critical systems

- In fact there is less than 50% chance of making the date



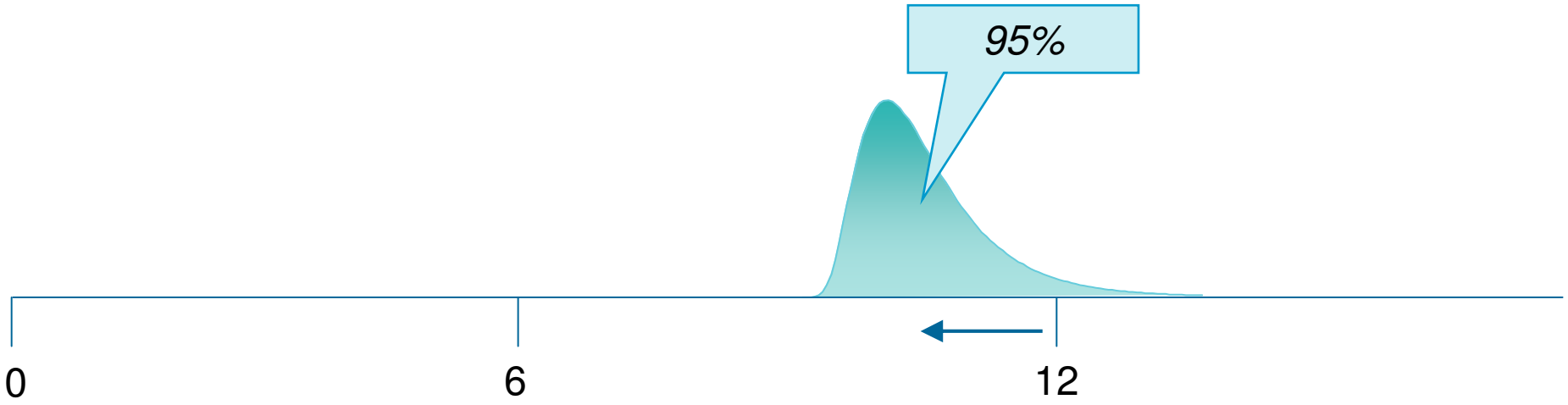
# Then what?

- Move out the date to improve likelihood of shipping?



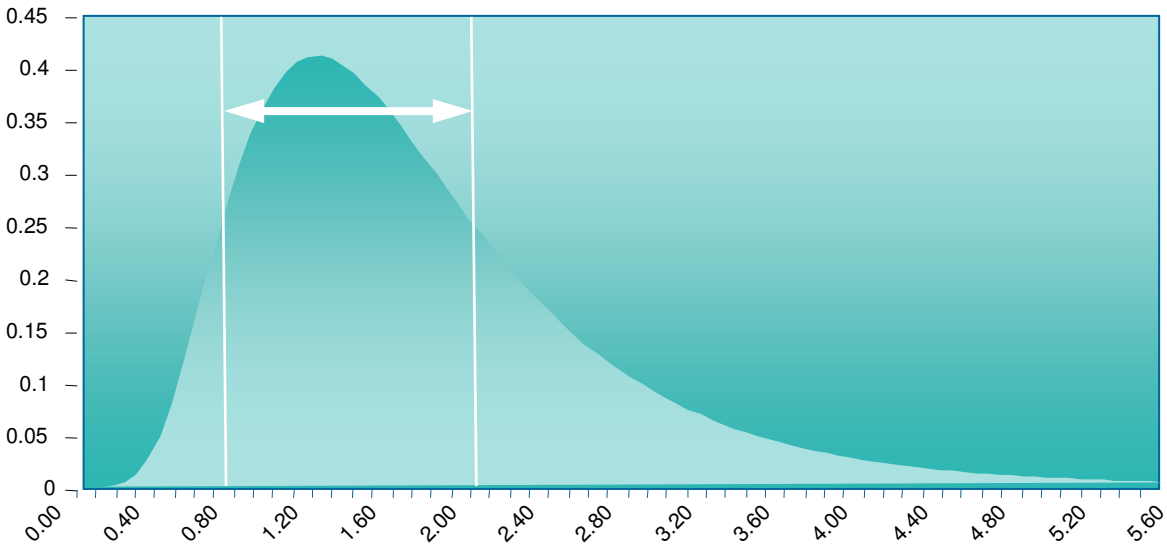
# Then what?

- Or move in the estimate by sacrificing quality or content?



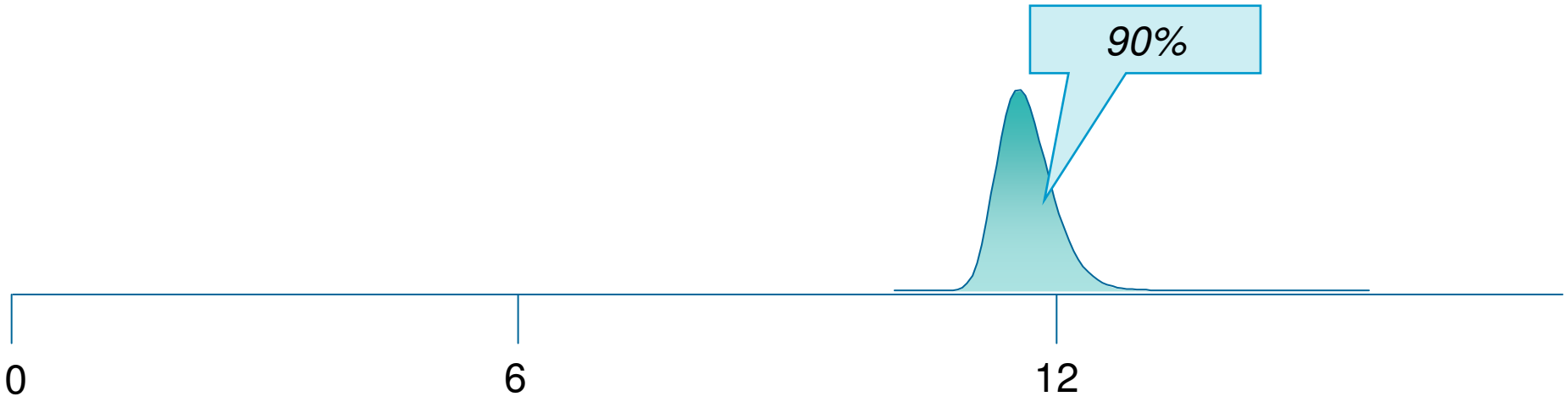
# Managing variances in scope, solution, plans: The real key to improving software economics

- Sources of uncertainty and variance
  - Lack of knowledge
  - Lack of confidence
  - Lack of agreement
- Reduction of variance reflects
  - Increased predictability of outcome
  - Increased knowledge about
    - Client needs
    - Technology capability
    - Team capability
  - Good decisions



# Then what?

- Determine the source of the variance
- Over the project lifecycle, reduce the variance to improve likelihood of shipping

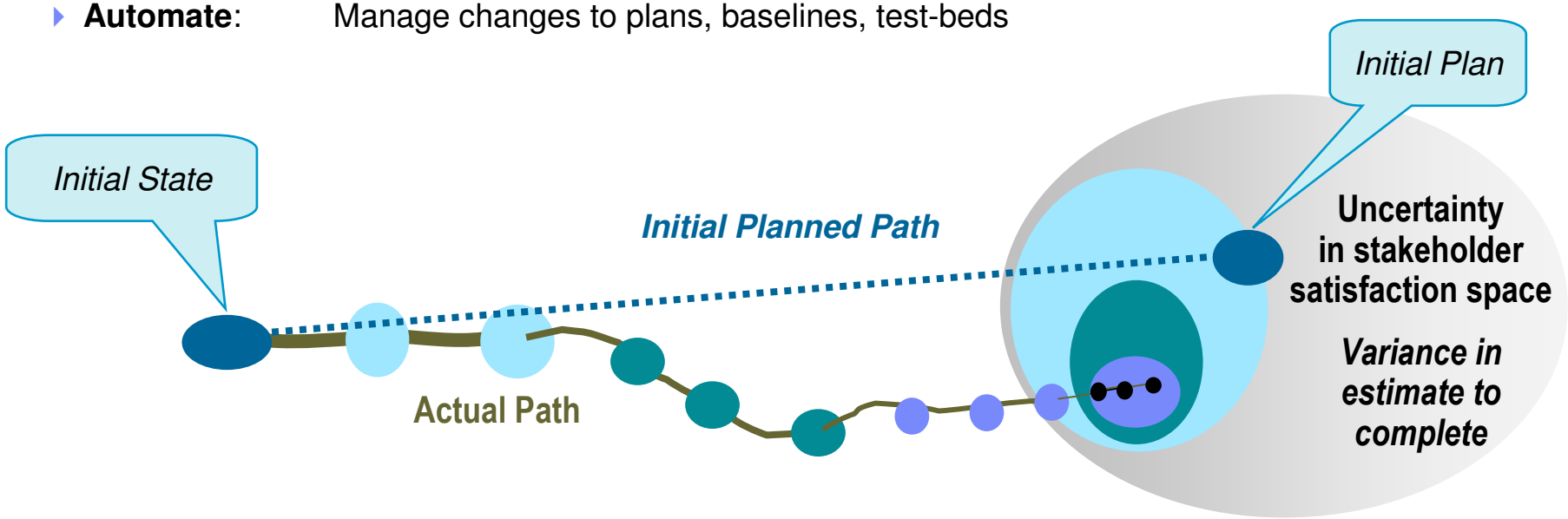


# Then what?

- Over the lifecycle, reduce the variance further to improve likelihood of shipping

# Measure and steer

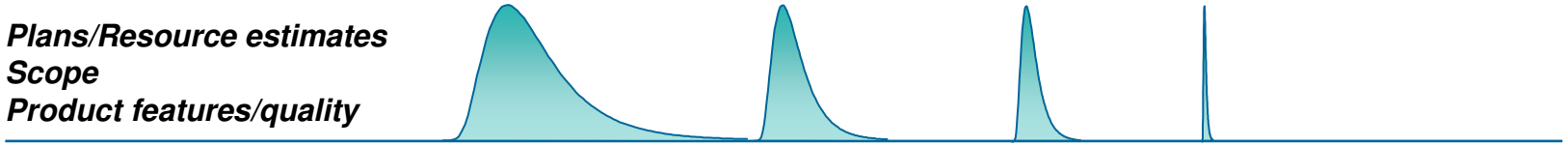
- At onset of program
  - **Report:** Establish estimates/variances of effort, cost, establish initial plan
  - **Collaborate**: Set initial scope and expectations with stakeholders
  - **Automate**: Establish a collaborative development environment
- At each iteration, improve estimates and report
  - **Report**: Values and variances of progress achieved, quality achieved, resources expended
  - **Collaborate**: With stakeholders to refine scope and plans
  - **Automate**: Manage changes to plans, baselines, test-beds



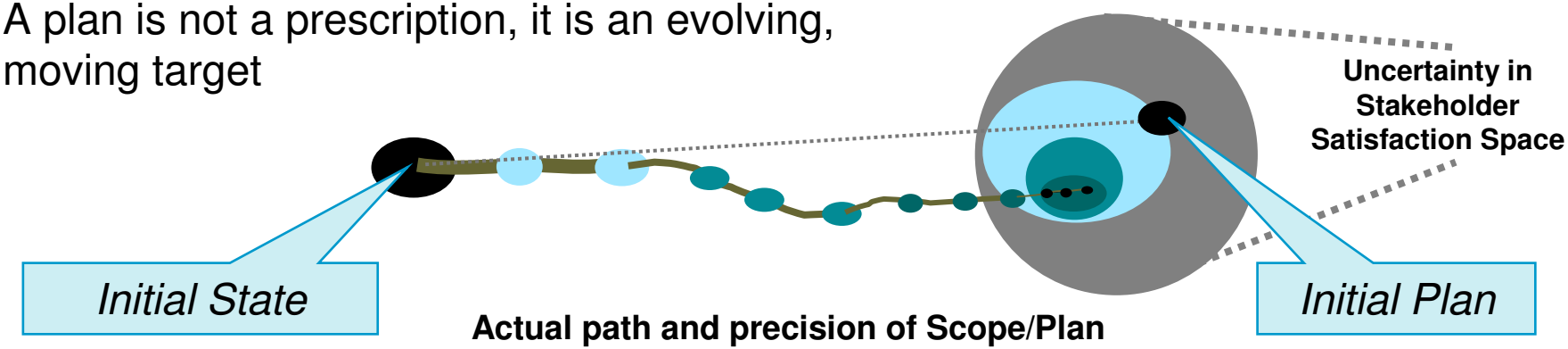
# Agile Governance = Managing Uncertainty = Managing Variance

- A completion date is not a point in time, it is a probability distribution


- Scope is not a requirements document, it is a continuous negotiation

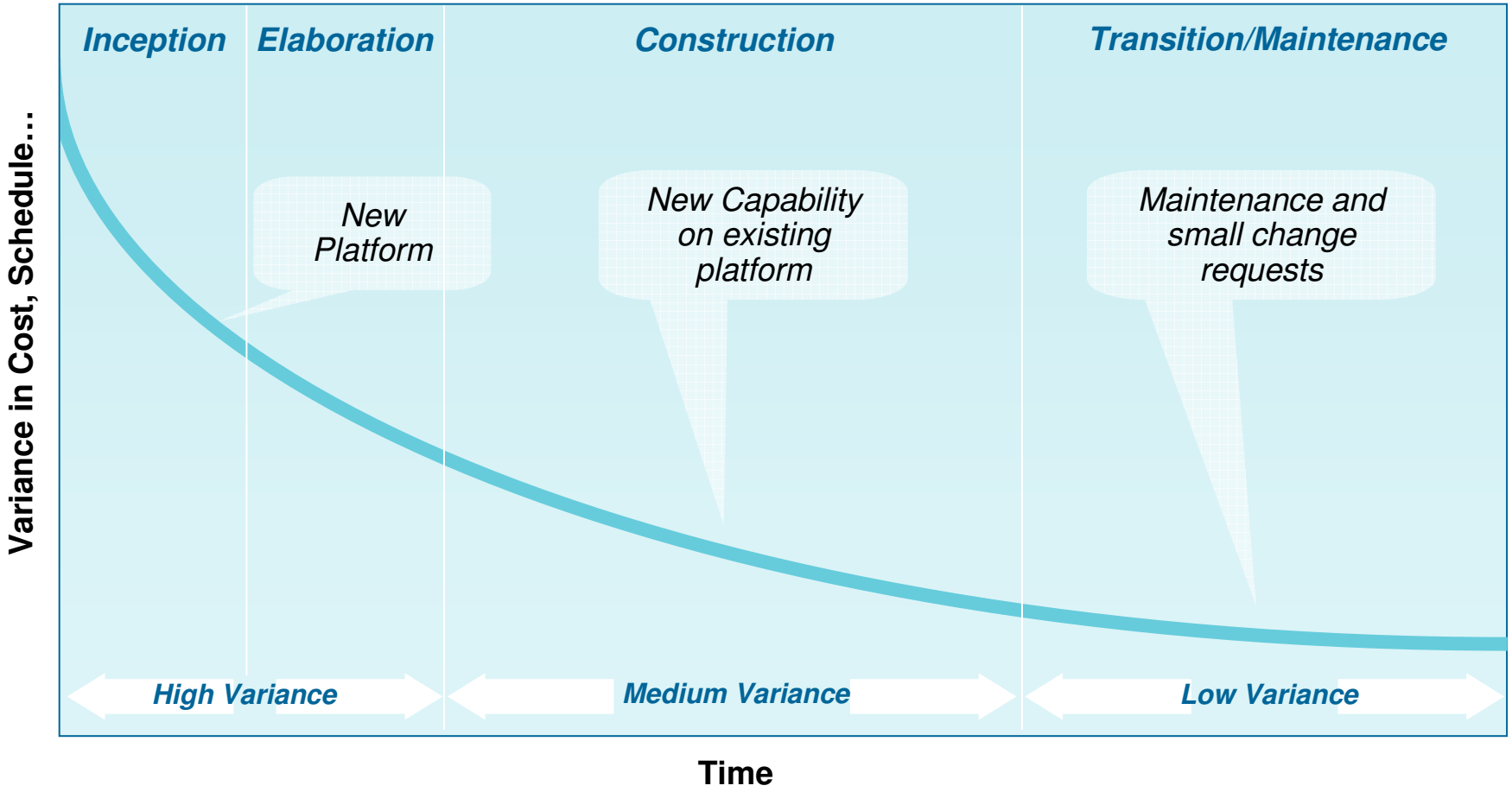



- A plan is not a prescription, it is an evolving, moving target



# Different projects need different governance

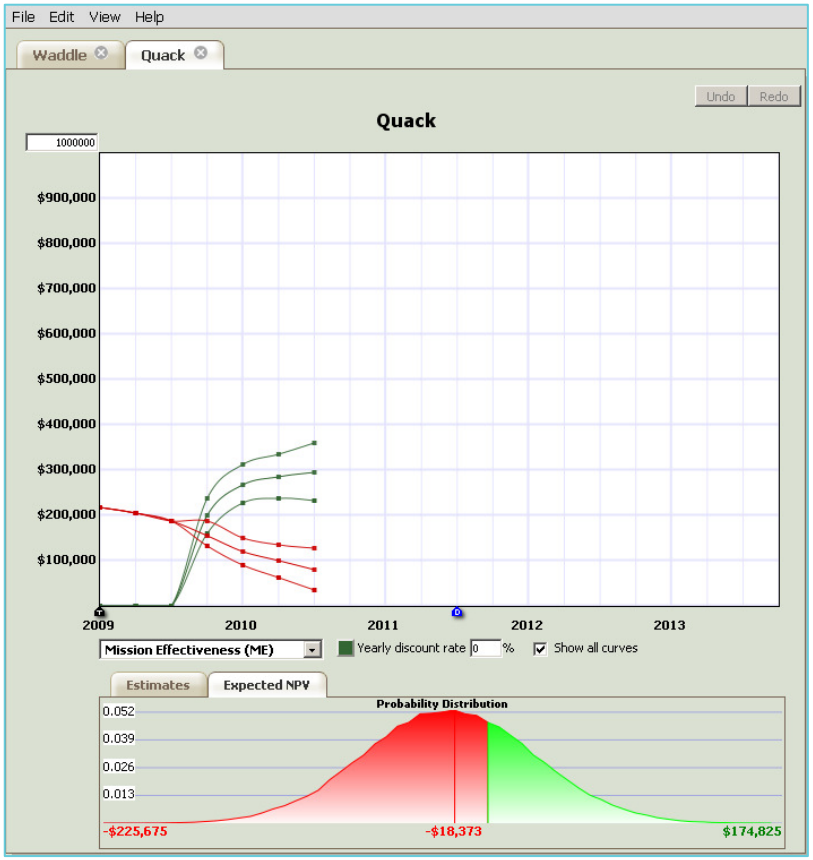
*Risk/uncertainty are the key discriminators*



# Rational is piloting two tools for managing schedule and value (benefits and cost) risk

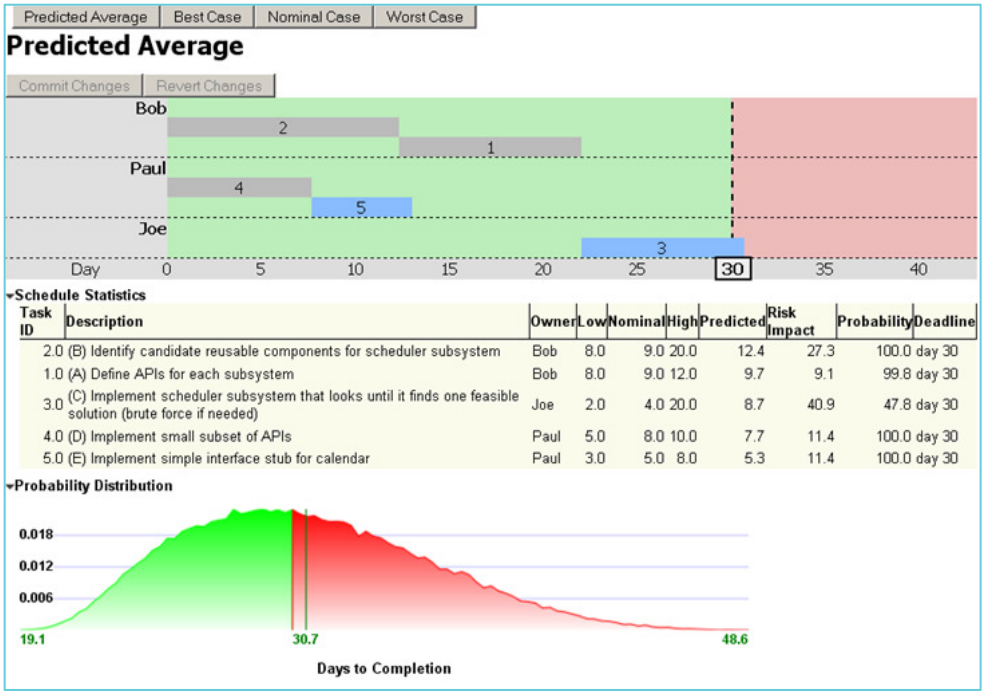
## Financier

***Ongoing view of program value***




## Tempo

***Ongoing view of schedule risk***



# Agenda

- Managing Variance: the Value of Agile Methods
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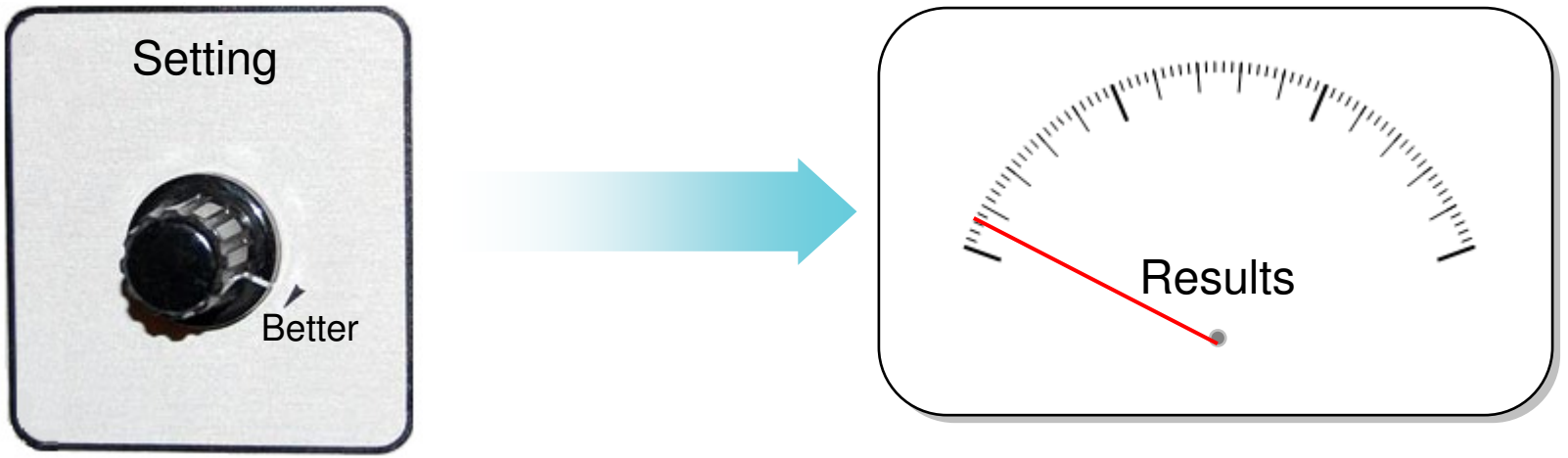
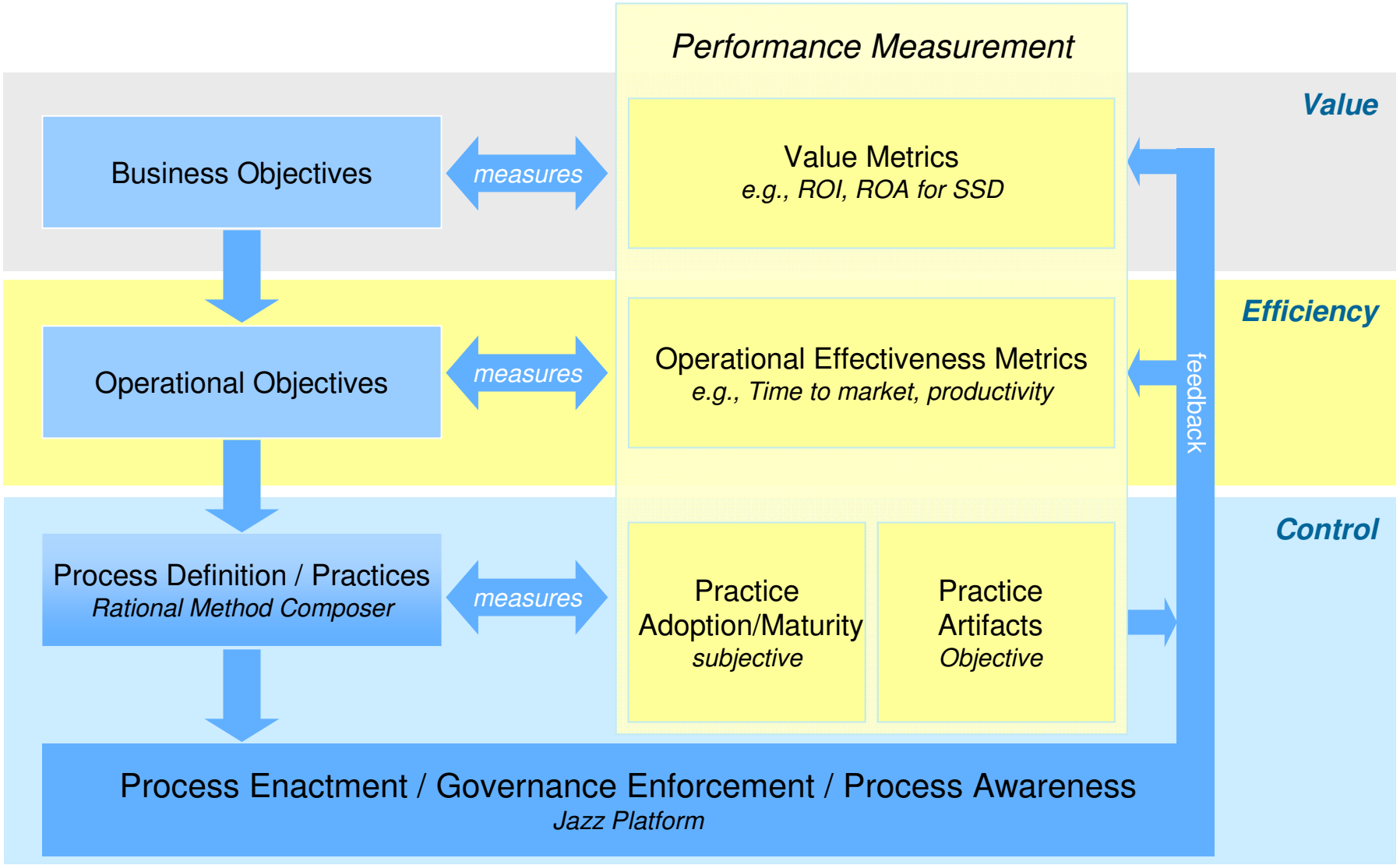
# In a control framework, one has knobs and meters

- One sets the knobs hoping to achieve optimal meter readings
  - The meter readings are called **outcome measures**
  - Sometimes you need additional measures to ensure the system has responded to the knobs, these are called **control measures**

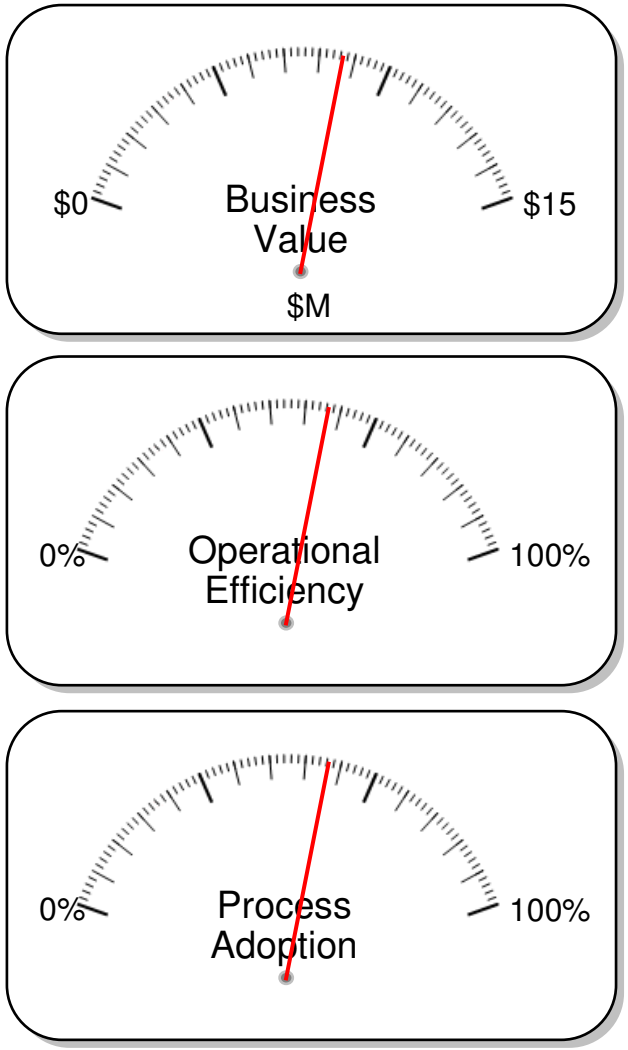


# Software and systems need a control framework



# Meters for software and systems development and delivery improvement

- Value
  - Return on Investment (ROI)
  - Return on Assets (ROA)
  - Product revenue profile
- Efficiency
  - Time to market, productivity
  - Program portfolio investment profile
  - Defect phase containment, scrap and rework rates
  - Application service levels
  - Defect densities, requirements churn, design churn
  - Skills improvement, training cost reduction
- Control
  - Practice adoption, project checkpoints
  - Artifact time between gates
  - Collaboration, skills mix



# Tailor to organizational and project context

- Agree on business value measures: Cost, profit, return on assets, market share, etc.
- Determine project mix type
  - Choose appropriate operational measures
  - Choose practices to achieve measures for project mix
  - Establish measures and feedback channels for closed loop control

| | Variance Examples | | |
|---|---|---|---|
| | ***Low*** | ***Medium*** | ***High*** |
| **Value** (Business Measures) | ▪ Cost of operations | ▪ Market share growth<br>▪ Time to market for new features | ▪ Profitability of one-of-a-kind system |
| **Efficiency** (Operational Measure) | ▪ Cost per change request<br>▪ Individual productivity | ▪ Cost per change request<br>▪ Team Productivity | ▪ Architectural stability<br>▪ Organizational productivity |
| **Controls** | ▪ Self check for practices | ▪ Beta releases<br>▪ Defect densities, removal rates | ▪ Stakeholder demonstrations |
| **Practices** | ▪ Requirements management<br>▪ Change management<br>▪ Iterative development | ▪ Agile planning<br>▪ Test driven development | ▪ Shared vision<br>▪ Risk based lifecycle<br>▪ Evolutionary Architecture |

# Measured Capability Improvement Framework (MCIF): A systematic approach to software excellence


*Determine right solution to deploy*

**Phase 1** — **Elicit and set business value objectives**

- Business objectives, contexts to operate within, and development approaches

**Phase 2** — **Determine the solution components**

- Incremental improvement roadmap
- Do Financial Analysis

*Deploy solution and measure results*

**Phase 3** — **Accelerate and monitor solution adoption using Rational's preferred approach**

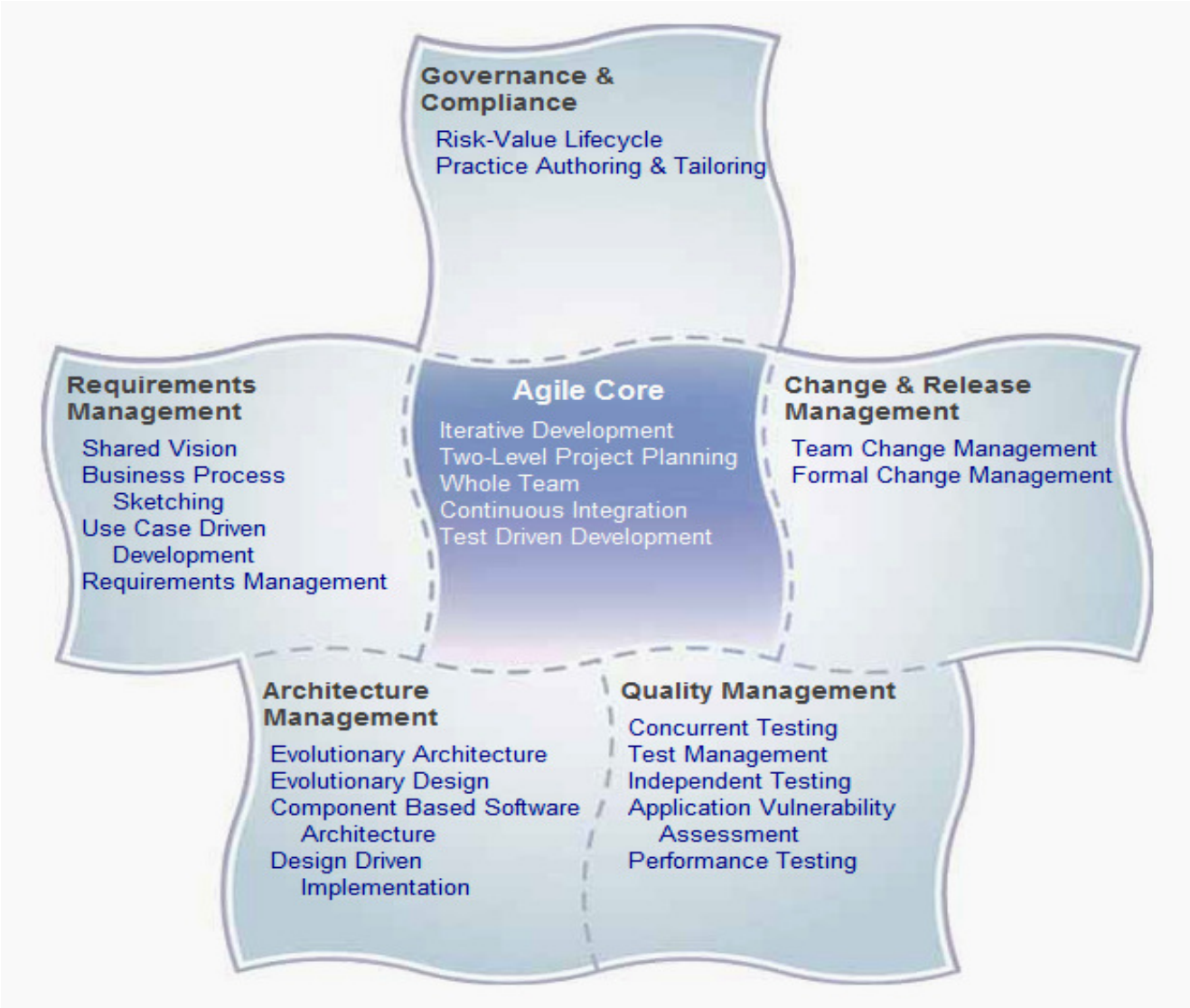
- Deploy practices and tools
- Adopt proper usage model to maximize ROI
- Measure and adapt

**Phase 4** — **Review and communicate business results**

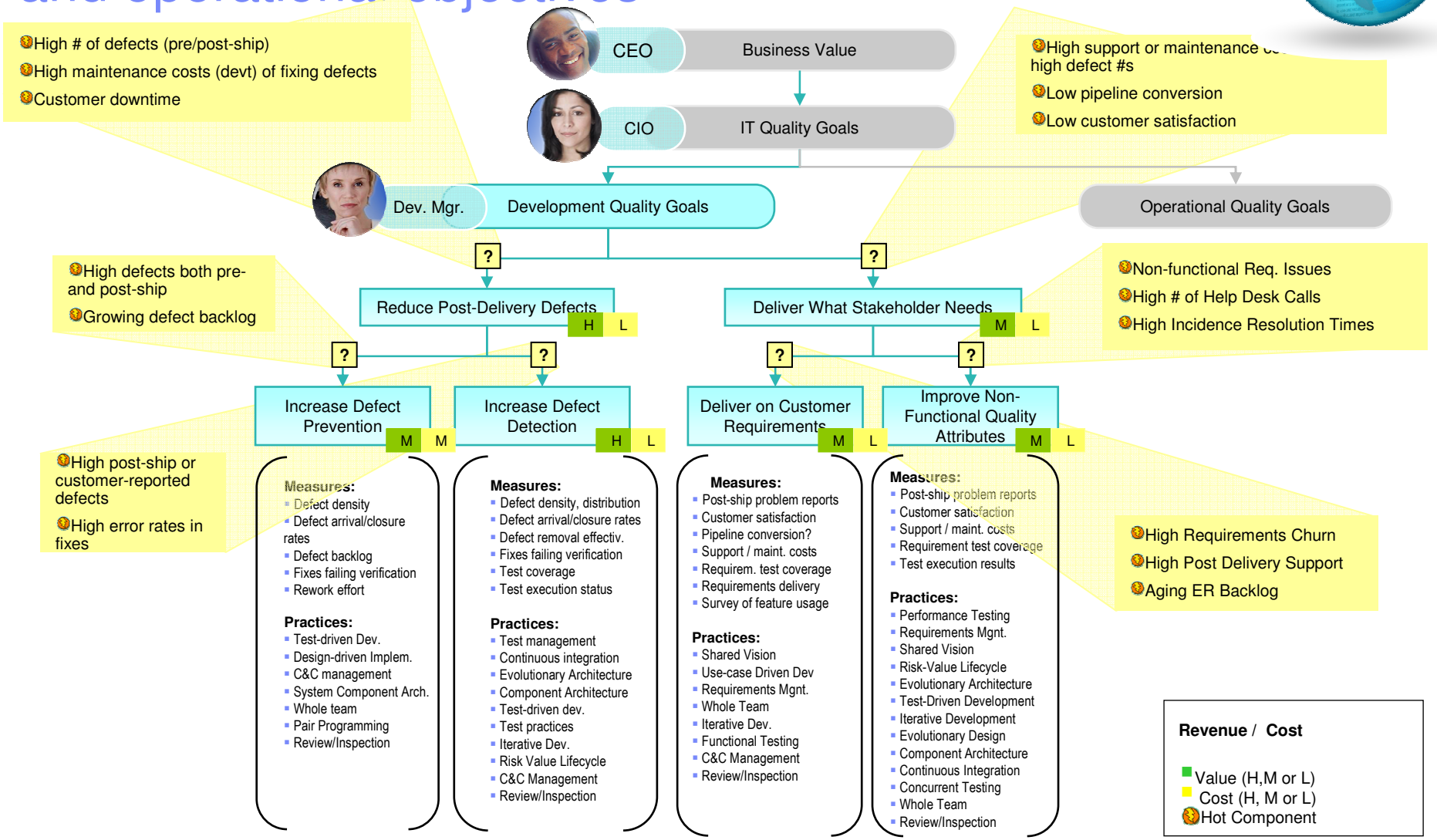
- Compile business value and results
- Conduct formal review with stakeholders

*Confirm results delivered and start on next project*

# Practices included as part of Rational Method Composer

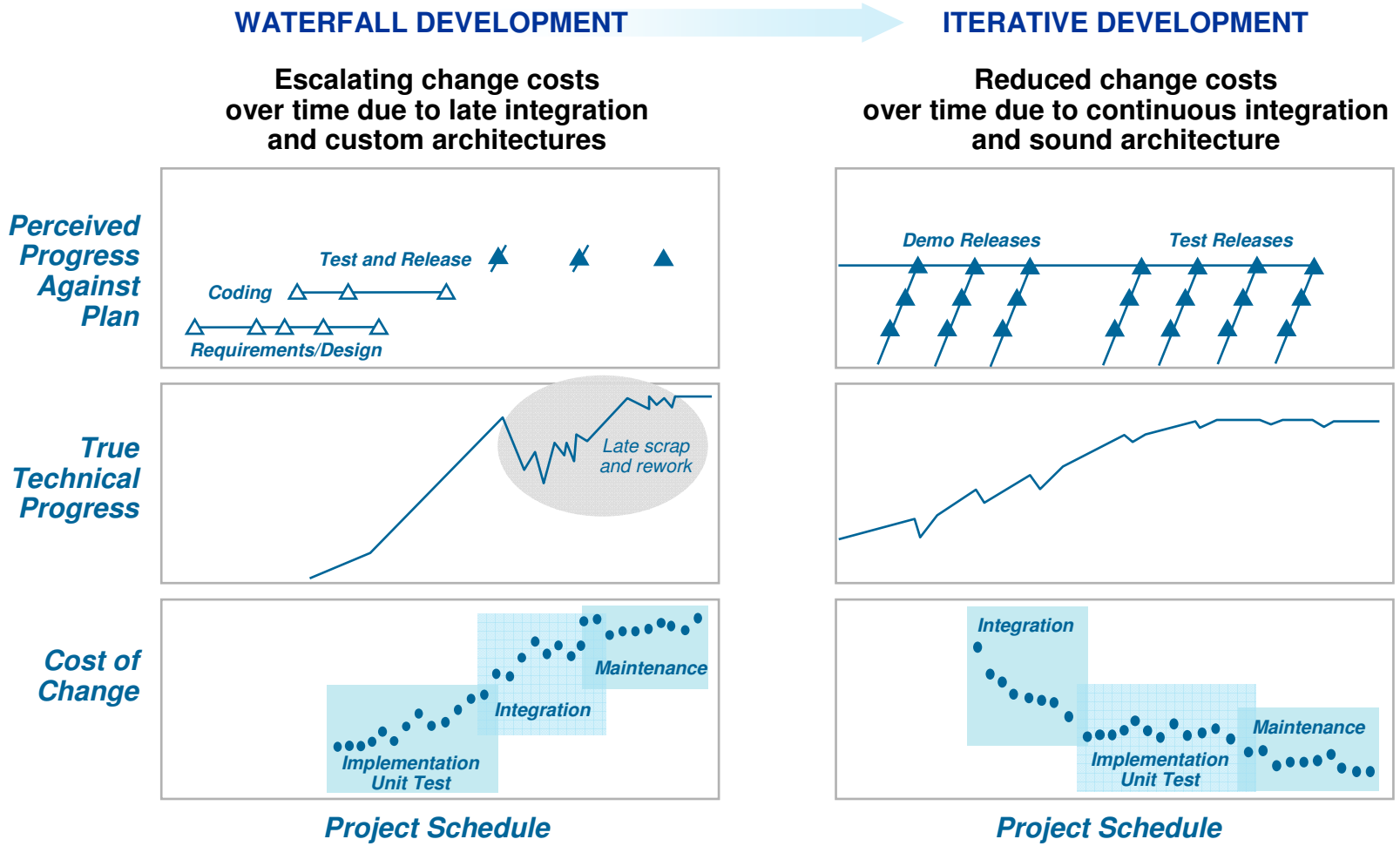



# Select practices and measures based on business and operational objectives



# Improving your process

*Measure the trends in the cost of baseline changes*

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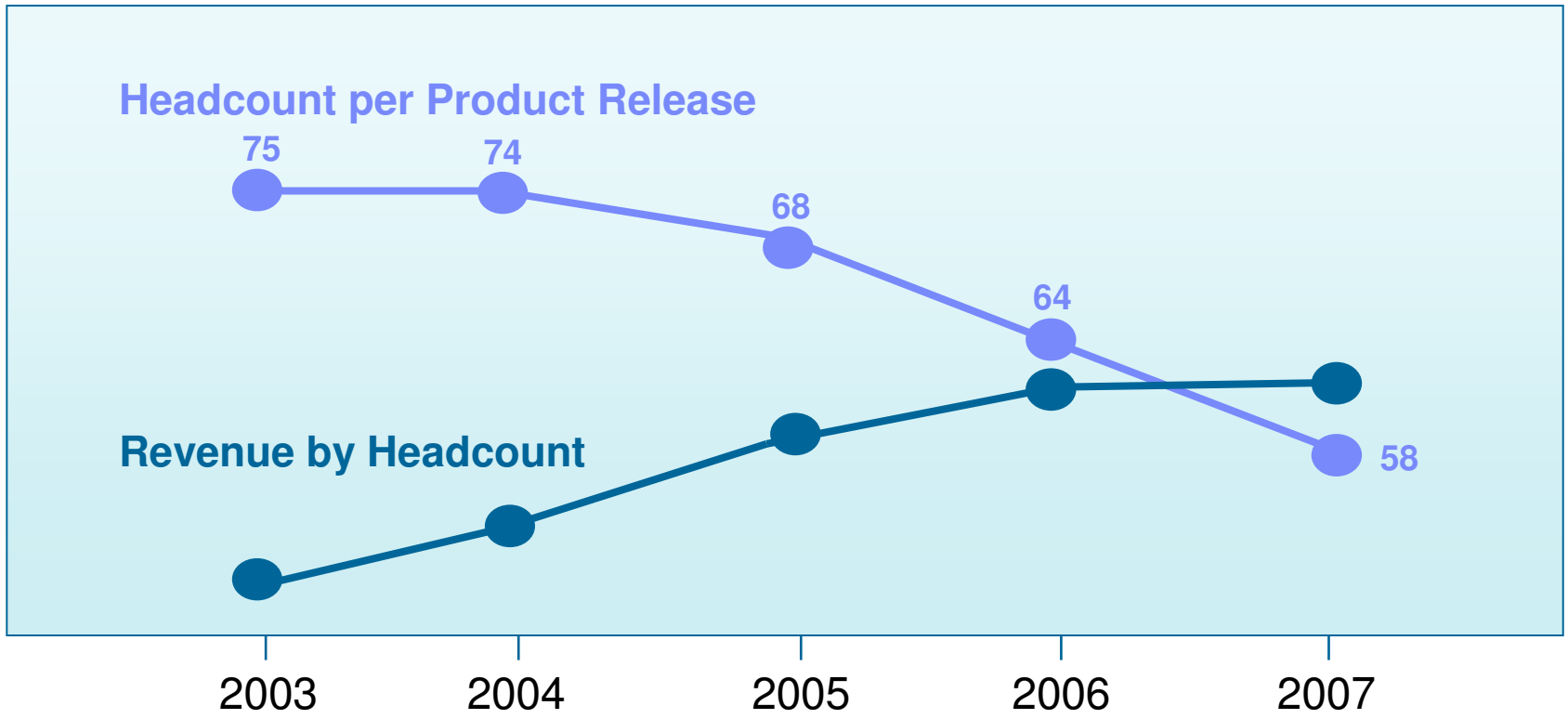
# IBM SWG is Going Agile

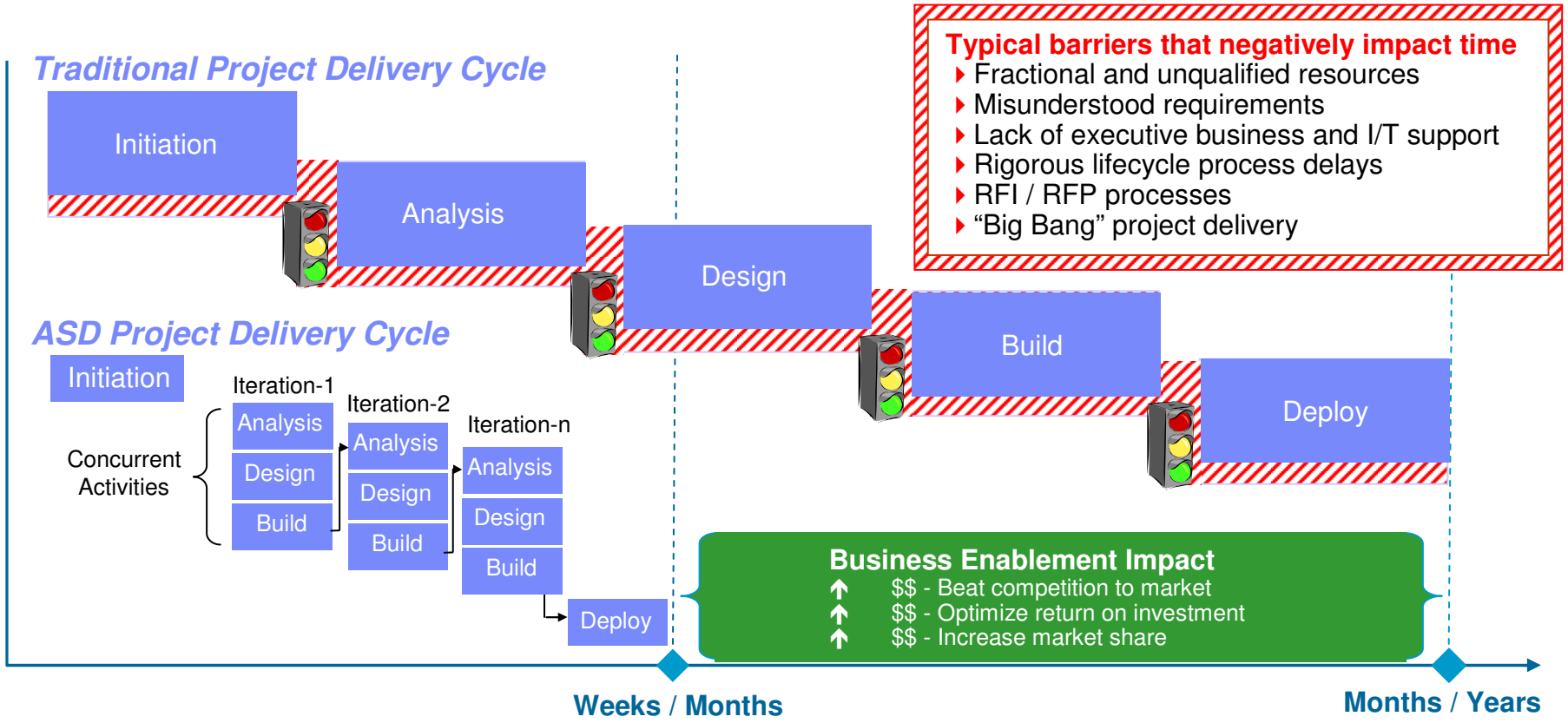
*One of the worlds largest agile transformations*

- Large scale transformation
  - ~35,000 developers
- Very diverse development contexts
  - From: New products, short time-to-market, Web 2.0
  - To: Mature products, risk reduction, older technologies
- Agility at Scale is key
  - Team size, geographical distribution, compliance, application complexity, …

# Improving productivity in IBM SWG through improved agility



# IBM GBS Accelerated Solution Delivery (ASD) Practice




**Key ASD attributes that remove or reduce time-to-market barriers**

- Right skills at right time in right ratio
- Facilitated sessions and co-location of business and I/T with onsite teams
- Organization focused only on project delivery using all best practices possible
- Agile project delivery using IBM Rational Collaborative Development Environment
- Iterative and incremental project, release and program delivery

Client Testimonial:

*"It used to take us months to just develop a business initiative and basic requirements. Now we accomplish that in days and develop the solution in months"*

# Metrics from IBM's ASD Practice accounts

| | Productivity | $'s per FP | Time to Market | Defects | Customer Satisfaction |
|---|---|---|---|---|---|
| Lincoln Financial Group | 25% | 30% | 25% | 42% | 5 of 5 |
| Scotiabank | 46% | 27% | 35% | 50% | 5 of 5 |
| RBC Royal Bank | 25% | 25% | 25% | 25% | 5 of 5 |
| Ford | 60% | 30% | 67% | To 6 per 1000 FP's | 4 of 5 |

ASD Support Material

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# Four patterns of success in achieving Agility at Scale

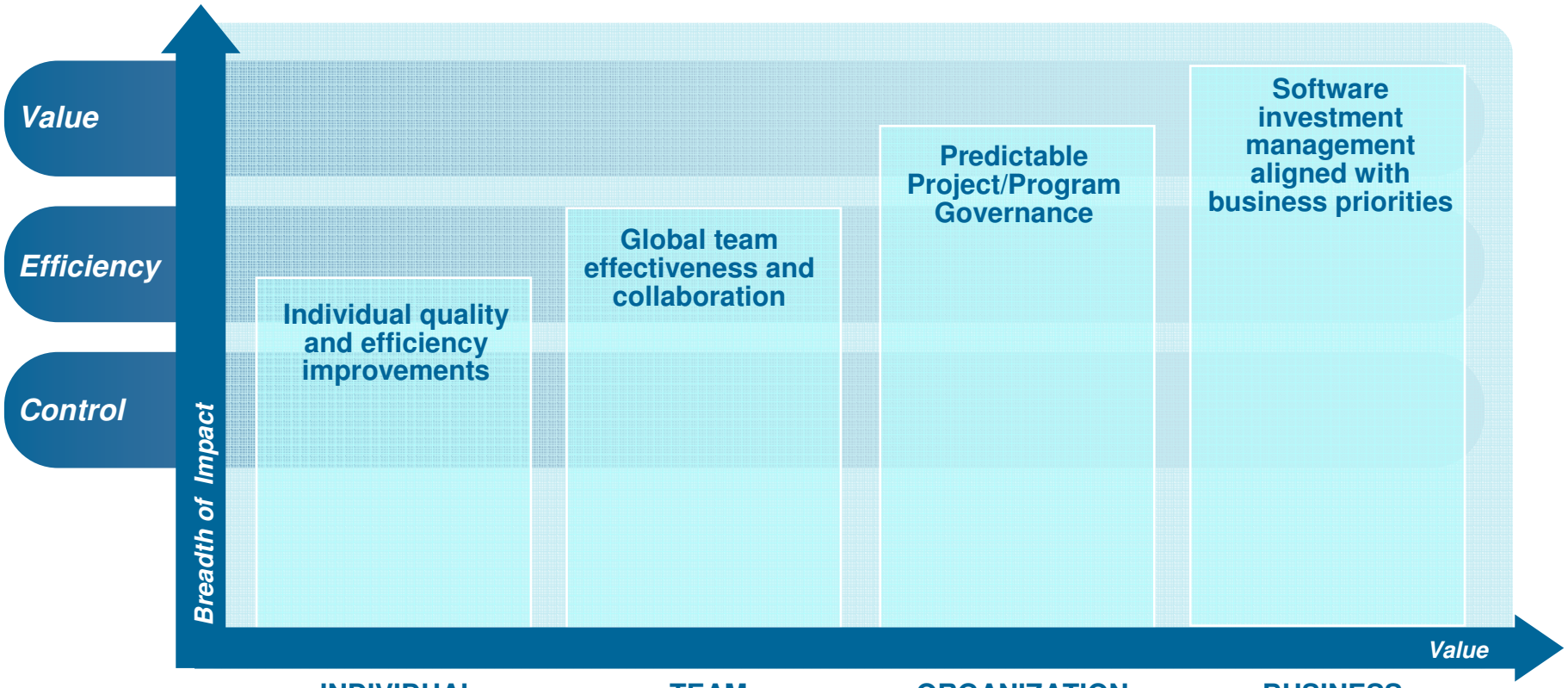
1. **Scope management ➔ *Asset based development***
   **Solutions evolve from requirements AND requirements evolve from available assets**
   ***As opposed to getting all the requirements right up front***

2. **Process management ➔ *Rightsize the process***
   **Process and instrumentation rigor evolves from light to heavy**
   ***As opposed to the entire project's lifecycle process should be light or heavy depending on the character of the project***

3. **Progress management ➔ *Honest assessments***
   **Healthy projects display a sequence of progressions and digressions**
   ***As opposed to progressing to 100% earned value with monotonically increasing progress against a static plan***

4. **Quality management ➔ *Incremental demonstrable results***
   **Testing needs to be a 1st class, full lifecycle activity**
   ***As opposed to a subordinate, later lifecycle activity***

# Effective software delivery enabled by agility and measurement



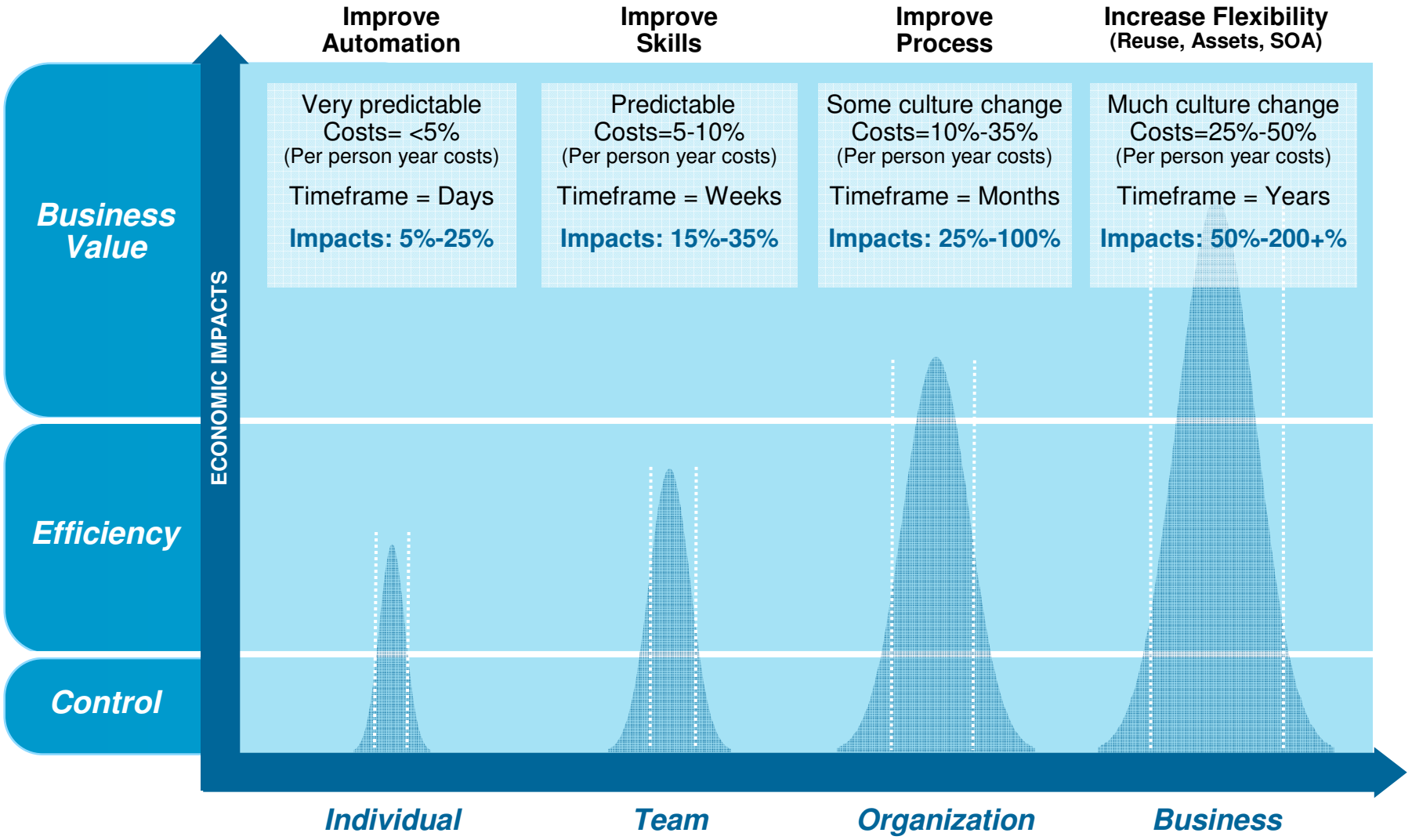

| | INDIVIDUAL | TEAM | ORGANIZATION | BUSINESS |
|---|---|---|---|---|
| ***Measures of increasing value*** | ▪ More creative time, less overhead time<br>▪ Painless governance<br>▪ More automation support | ▪ Fewer meetings<br>▪ Less scrap/rework<br>▪ Earlier defect detection<br>▪ Honest metrics | ▪ More reusable assets, services, skills, practices and measures<br>▪ More predictable outcomes<br>▪ Higher ROI | ▪ Optimized investments and supply chains<br>▪ Software development as an first class business process<br>▪ Business optimization |

# Improving software economics in each dimension

$$\text{Time or Cost To Build} = (\text{Complexity})^{(\text{Process})} * (\text{Team}) * (\text{Tools})$$

| | 1960s-1980s | 1990s-2000s | Today and forward… |
|---|---|---|---|
| **Complexity** | 100% Custom | 30% Reused Assets<br>70% Custom | **70% Reused Assets<br>30% Custom** |
| **Process** | Ad-hoc | Repeatable | **Agility at Scale<br>Managed and Measured** |
| **Teams** | Collocated<br>On the job training | Collocated<br>Software skills | **Globally Distributed<br>Skills shared anywhere** |
| **Tools** | Proprietary<br>Not integrated | Mix of Proprietary<br>& Commercial<br>Not integrated | **Commercial<br>Collaborative<br>Development Platform** |
| **Project Performance** | Predictable<br>Over budget, over schedule | Unpredictable<br>Infrequently on budget, on schedule | **Predictably<br>On budget, on schedule** |
| **Success Rate** | 10% | 25%-33% | **>60%** |

# Measuring software delivery value against cost



# Some final thoughts

***Software delivery is a discipline of software economics balancing risks and opportunities***

***Process enactment and measurement are imperatives to achieving agility at scale***

***Software delivery requires a platform that is architected for automation, collaboration and reporting***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- Rational Software Delivery Platform
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- Deliver enduring quality
- Enable enterprise modernization
- Ensure Web security & compliance
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